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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)

NVS 014 US

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on 11/18/2005

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Application Number

10/072,357

Filed

02/06/2002

First Named Inventor

Michael D. Kilgore

Art Unit

2822

Examiner

Maria F. Guerrero

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

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Registration number 25,557

☐ attorney or agent acting under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34 _____

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NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Attachment to Pre-Appeal Brief Request For Review – Appl. No. 10/072,357

Claims 1-16, 18 and 25-28 are pending, all of which were rejected in the final Office Action dated May 18, 2005 (the "Office Action"). The Advisory Action dated October 17, 2005, (the "Advisory Action") indicated that Claims 5 and 28 are now objected to rather than rejected but maintained the rejection of Claims 1-4, 6-16, 18 and 25-27.

Claim 1 reads as follows:

A method of processing a semiconductor wafer that reduces plasma-induced damage to the wafer, said method comprising creating a plasma in a reaction chamber and performing all of the following in the sequence indicated while maintaining said plasma in said reaction chamber:

inserting the wafer into the reaction chamber;
processing the wafer in the plasma;
cooling the wafer by an amount sufficient to terminate processing the wafer; and
removing the wafer from the reaction chamber.

Claims 2-16, 18 and 25-28 depend from Claim 1.

In the Office Action, Claim 1 was rejected under 35 U.S.C 102(b) as being anticipated by Orczyk et al. and under 35 U.S.C. 103(a) as being unpatentable over Kwan et al.

This Request will focus on the following two limitations of Claim 1.

I. "creating a plasma in a reaction chamber and performing all of the following in the sequence indicated while maintaining said plasma in said reaction chamber: inserting the wafer into the reaction chamber;"

Orczyk et al.:

The Office Action cited two passages of Orczyk et al. that are relevant to this limitation: col. 3, lines 50-57, and col. 13, lines 40-47 (see Office Action, paragraphs 4 and 9).

Orczyk et al. teach as follows at col. 3, lines 50-57:

The sequence of steps includes, in one embodiment, introducing a wafer into a chamber and setting an initial chamber pressure with process gas or gases. *Then*, a plasma is formed or struck, by applying radio frequency (RF) power to a plasma

coupling structure. The plasma heats the wafer above 100° C. prior to deposition. (Emphasis added.)

Orczyk et al. teach as follows at col. 13, lines 40-47:

A substrate is placed in the deposition system (step **701**), and argon is admitted at a rate of 95 sccm to gas nozzles **39** and at a rate of 15 sccm to top nozzle **45**. These gas flows establish an initial chamber pressure of about 50 millitorr (step **702**), based on a fixed throttle valve setting. A plasma is struck at this initial pressure (step **703**) by applying 1,000 W of RF power to top coil **29**.

Both of the passages cited by the Examiner clearly teach introducing a wafer or substrate into the reaction chamber and *then* striking a plasma, the exact opposite of what Claim 1 recites. Accordingly, they do not establish a prima facie case for the rejection of Claim 1.

Kwan et al.:

The Office Action cited three portions of Kwan et al. that appear to be relevant to the above limitation: Fig. 3, col. 13, lines 47-67, and col. 2, lines 57-65 (see Office Action, paragraphs 5 and 9).

Fig. 3 of Kwan et al. contains a flowchart of an plasma process that includes the following steps: Step 310-“LOAD SUBSTRATE INTO PROCESS CHAMBER,” Step 330-“PRESET RF BIAS,” and Step 340-“APPLY RF SOURCE POWER.”

Col. 13, lines 47-67, of Kwan et al. describe the flowchart of Fig. 3 and indicate that the substrate is introduced into the process chamber before the plasma is struck.

Col. 2, lines 57-65, of Kwan et al. teach as follows:

In this embodiment, a dielectric film is deposited on the substrate in a process chamber through a series of gas-cycling steps. First, a gaseous mixture containing a deposition gas and an inert gas source is provided to the process chamber. A high-density plasma is generated from this gaseous mixture to deposit some material on the substrate, partially filling the gaps before a void is formed.

The first two citations indicate clearly that the substrate is loaded into the process chamber *before* the plasma is formed, the exact opposite of what Claim 1 recites, and the final citation does not really address this issue. Thus none of the portions of Kwan et al. that were cited in the Office Action establish a prima facie case for the rejection of Claim 1.

Paragraph 9 of the Office Action

At page 6, lines 5-8, of the Office Action, under the heading "Response to Arguments," the Examiner specifically addressed Applicant's argument that Kwan et al. teach placing the substrate in the process chamber before the plasma is formed.

Applicant argued that Kwan et al. teaches placing the substrate in the process chamber before striking the plasma. However, Kwan et al. discloses first, a gaseous mixture is provided to the chamber and plasma is generated from this gaseous mixture (col. 2, lines 57-65).

Applicant submits that the Examiner's response is legally insufficient. There is nothing inconsistent between generating a plasma from a gaseous mixture that has been provided to the chamber and placing the substrate in the process chamber *before* the plasma is generated.

At page 6, lines 15-19, of the Office Action the Examiner again referred to the Applicant's argument on this point.

In addition, Applicant argued that that references failed to describe the step of maintaining the plasma in the reaction chamber during inserting the wafer into the reaction chamber. However, Applicant admitted prior art is cited as evidence that this step do [sic] not impart patentability to the claims because is [sic] well known in the art (page 2, page 3, line 1-7).

This response is also legally insufficient. The rejection of Claim 1 was based on Orczyk et al. (under 35 U.S.C. 102(b)) and Kwan et al. (under 35 U.S.C. 103(a)). Nowhere was the admitted prior art (APA) referenced in those rejections. It is well established that claims must be read as a whole. It is insufficient to base a rejection on a citation to a prior art reference that teaches a single limitation of a claim.

Moreover, the APA could not have been used in the rejection over Orczyk et al., since a rejection under 35 U.S.C. 102 must be based on a single prior art reference. And if the Examiner intended to combine APA with Kwan et al., the rejection is still legally insufficient inasmuch as she failed to present any suggestion or motivation to combine the APA with Kwan et al. See MPEP §2143.

A brief review of the APA indicates that no such suggestion or motivation could be found in this situation. The APA essentially describes certain advantages to limiting the exposure of the IC device to the plasma and other offsetting advantages to maintaining the plasma continuously. (See the specification at page 2, line 22, to page 3, line 7.) Limiting the exposure of the device to the plasma tends to reduce plasma-induced damage to the gate

dielectric, while maintaining the plasma continuously helps to prevent flaking from the interior surface of the chamber. There is nothing in the description of this "trade-off" that would motivate a person skilled in the art to modify Kwan et al. by inserting the substrate into the chamber after the plasma has been formed. First, to the extent that they deal with the issue at all, Kwan et al. clearly teach that the substrate should be introduced into the chamber *before* the plasma is formed. Second, it is through the very process recited in Claim 1 that this "trade-off" can be avoided. A person of skill in the art would not recognize this benefit by reading Kwan et al. in conjunction with the APA. Hence, such a person would not be motivated to modify Kwan et al. by inserting the wafer into the reaction chamber while maintaining the plasma in the reaction chamber.

II. "processing the wafer in the plasma; cooling the wafer by an amount sufficient to terminate processing the wafer"

Claim 1 recites "processing the wafer in the plasma" and then "cooling the wafer by an amount sufficient to terminate processing the wafer." The Examiner interpreted this language as not requiring that all processing be terminated. (See Office Action, page 6, lines 11-12)

This interpretation is at war with the plain meaning of the language. (See MPEP § 2111.01) In normal usage, to say that "processing is terminated" means that all processing is terminated. While claims are given their broadest reasonable interpretation during examination, the interpretation must be "reasonable." It is not reasonable to interpret the phrase "terminate processing" as not requiring that all processing be terminated.

The Examiner apparently admits that neither Orczyk et al. nor Kwan et al. teach or suggest cooling the wafer sufficiently to terminate all processing. Applicant agrees with this reading of Orczyk et al. and Kwan et al. and submits that if Claim 1 is interpreted as requiring that all processing be terminated, it is allowable over Orczyk et al. and Kwan et al.

Claims 2-16, 18 and 25-28 depend from Claim 1. In the Office Action, Claims 8, 25 and 26 were rejected under 35 U.S.C 102(b) as being anticipated by Orczyk et al., and Claims 2-11, 15, 16, 27 and 28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kwan et al. Since Claim 1 is allowable over Orczyk et al. and Kwan et al. for the reasons stated above, Claims 2-11, 15, 16 and 25-28 are also allowable.

The Advisory Action indicated that the Amendment After Final Action dated September 19, 2005, overcame the rejection of Claims 5 and 28 but that Claims 5 and 28 are objected to.

In the Office Action, Claims 14 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kwan et al. in view of Chang et al., and Claims 12 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kwan et al. in view of Wang et al. (See paragraphs 7 and 8 of the Office Action.) With regard to Claims 14 and 18, Chang et al. was cited as showing "etching a photoresist and the wafer having a gate dielectric layer." With regard

to Claims 12 and 13, Wang et al. was cited as showing "a plasma process to deposit a phosphorous-doped [sic] silicon dioxide layer."

Claims 12, 13, 14 and 18 depend from Claim 1, which is allowable over Kwan et al. for the reasons described above. Applicants have reviewed Chang et al. and Wang et al. and can find nothing in either of those references that overcomes the defects of Kwan et al. with regard to Claim 1. Claims 12, 13, 14 and 18 are therefore allowable.

For the above reasons, the Applicant respectfully requests allowance of Claims 1-16, 18 and 25-28. Alternatively, if the panel considers that the rejection of Claims 12, 13, 14 and 18 is not properly reviewable in a Pre-Appeal Request For Review, the Applicant requests allowance of Claims 1-11, 15, 16 and 25-28 and a reopening of the prosecution as to Claims 12, 13, 14 and 18, allowing the Examiner to state why the rejection of these claim should stand.